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(71)Applicant : **NEC CORP**

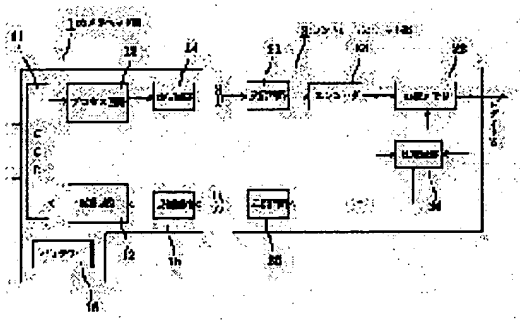
(72)Inventor : **SATO MASASHI**

(54) WIRELESS IMAGE PICKUP DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To extend the service life of a battery by saving power consumption.

SOLUTION: This wireless camera is made up of a camera head section 1 provided with a CCD 11 converting optical image information into a charge image, a drive circuit 12 controlling the CCD 11 and a battery 16 to supply power to them and a control unit section 2 provided with an image memory 22 connecting to the camera head section 1 through a radio channel and storing tentatively the image read from the CCD 11 and with a comparator circuit 24 monitoring a motion of an image. The drive circuit 12 reads continuously images (at 60 fields/sec) when the image has a motion from the CCD 11 and reads images intermittently (at 1 field/sec) from the CCD 11 when the comparator circuit 24 detects a standstill state of the image. While the images are read intermittently from the CCD 11, a still image stored in the image memory 22 is outputted to a television receiver.



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CLAIMS

[Claim(s)]
[Claim 1] The solid state image sensor which carries out photo electric conversion of the optical image information caught with the camera lens to the image of a charge, The drive circuit which reads said image from this solid state image sensor on a predetermined read-out frequency, The camera head section equipped with the cell which supplies power to said solid state image sensor and a drive circuit, It is wireless image pick-up equipment which consists of the control unit section equipped with the image memory which stores temporarily said image which was connected with this camera head section by the radio transmission, and was read from said solid state image sensor. Said drive circuit is wireless image pick-up equipment characterized by reading an image from said solid state image sensor intermittently when said optical image information does not change in time, while reading an image from said solid state image sensor continuously, when said optical image information changes in time.
[Claim 2] Said drive circuit while judging that said control unit section or the camera head section is equipped with the motion supervisory circuit for supervising a motion of said image read from said solid state image sensor, and this motion supervisory circuit does not have a motion in said image is wireless image pick-up equipment according to claim 1 characterized by reading an image from said solid state image sensor intermittently.
[Claim 3] The 1st drive signal generating circuit which generates the 1st driving signal for said drive circuit to read an image from said solid state image sensor continuously, The 2nd drive signal generating circuit which generates the 2nd driving signal for reading an image from said solid state image sensor intermittently, Wireless image pick-up equipment according to claim 2 characterized by coming to have the circuit changing switch which chooses alternatively said 1st or 2nd drive signal generating circuit based on the monitor result of said motion supervisory circuit.
[Claim 4] Said read-out frequency at the time of reading an image intermittently is wireless image pick-up equipment according to claim 1, 2, or 3 characterized by being set as the range of 1 / 10 - 1/120 of the read-out frequency at the time of reading an image continuously.
[Claim 5] Said control unit section is wireless image pick-up equipment according to claim 1, 2, 3, or 4 characterized by outputting the still picture currently stored in said image memory during the period when said drive circuit is reading the image from said solid state image sensor intermittently.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the wireless image pick-up equipment which consists of the camera head section set as an image pick-up site, and the control unit section which is set as the location distant from this image pick-up location, and is connected with the camera head section by wireless.
[0002]
[Description of the Prior Art] For example, like a portable call signal receiving set (mobile station) or a notebook computer, in order to reduce useless power consumption in the equipment which uses a cell as a power source and to prolong the life of a cell, there are many things equipped with a certain kind of auto-power-off function (for example, reference, such as JP,63-141420,A, JP,1-260516,A, and JP,63-62014,A).
[0003] By the way, if the cable is attached to the television camera, since the wiring activity is complicated, an image pick-up environment will be restricted and carried out. Then, the wireless camera which connected the camera head section of a CCD drive and the control unit section which has an image memory by the radio transmission is offered from the former. With this kind of wireless camera, when the camera head section served as a dc-battery drive, since CCD (charge coupled device) also served as continuous action (60 read-out/second) at the time of an image pick-up, there was a problem that it could not bear in prolonged continuous duty. As a means to cancel such un-arranging, it is possible to apply an auto-power-off technique given [above-mentioned] in an official report to a wireless camera.
[0004]
[Problem(s) to be Solved by the Invention] However, an auto-power-off technique given in JP,1-260516,A, JP,63-62014,A, etc. When the key input from a keyboard stops predetermined time, it is the technique which intercepts the power source of a notebook computer etc. automatically. Moreover, the conventional technique given in JP,63-141420,A By operating intermittently the switch for turning an amplifier on and off The power consumption at the time of the call signal reception from a key station is reduced, extension of a battery life is aimed at, and neither of the techniques can be used for reduction of the power consumption at the time of wireless camera actuation (at the time of an image pick-up).
[0005] This invention was made in view of the above-mentioned situation, can save power consumption sharply, and aims at offering the wireless image pick-up equipment which can prolong battery life remarkably.
[0006]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 The solid state image sensor which carries out photo electric conversion of the optical image information caught with the camera lens to the image of a charge, The drive circuit which reads the above-mentioned image from this solid state image sensor on a predetermined read-out frequency, The camera head section equipped with the cell which supplies power to the above-

mentioned solid state image sensor and a drive circuit, Connect with this camera head section by the radio transmission, and the wireless image pick-up equipment which consists of the control unit section equipped with the image memory which stores temporarily the above-mentioned image read from the above-mentioned solid state image sensor is started. The above-mentioned drive circuit is characterized by reading an image from the above-mentioned solid state image sensor intermittently, when the above-mentioned optical image information does not change in time, while reading an image from the above-mentioned solid state image sensor continuously, when the above-mentioned optical image information changes in time.

[0007] Moreover, invention according to claim 2 relates to wireless image pick-up equipment according to claim 1, the above-mentioned control unit section or the camera head section is equipped with the motion supervisory circuit for supervising a motion of the above-mentioned image read from the above-mentioned solid state image sensor, and while this motion supervisory circuit judges that there is no motion in the above-mentioned image, the above-mentioned drive circuit is characterized by reading an image from the above-mentioned solid state image sensor intermittently.

[0008] Moreover, the 1st drive signal generating circuit which generates the 1st driving signal for invention according to claim 3 to relate to wireless image pick-up equipment according to claim 2, and for the above-mentioned drive circuit read an image from a solid state image sensor continuously, It is characterized by coming to have the circuit changing switch which chooses alternatively the above 1st or the 2nd drive signal generating circuit from the above-mentioned solid state image sensor based on the monitor result of the 2nd drive signal generating circuit which generates the 2nd driving signal for reading an image intermittently, and the above-mentioned motion supervisory circuit.

[0009] Moreover, invention according to claim 4 relates to claims 1 and 2 or wireless image pick-up equipment given in three, and is characterized by setting the above-mentioned read-out frequency at the time of reading an image intermittently as the range of 1 / 10 - 1/120 of the read-out frequency at the time of reading an image continuously.

[0010] Moreover, invention according to claim 5 relates to claims 1, 2, and 3 or wireless image pick-up equipment given in four, and it is characterized by the above-mentioned control unit section outputting the still picture currently stored in the above-mentioned image memory during the period when the above-mentioned drive circuit is reading the image from the above-mentioned solid state image sensor intermittently.

[0011]

[Function] Since according to the configuration of this invention the read-out frequency (drive frequency) of a solid state image sensor decreases to 1 / 10 - 1/120 compared with the case where there is a motion when there is no motion on a screen, that part and power can be saved. Therefore, battery life can be prolonged remarkably. in addition -- if it is made to carry out the consecutive output of the static image in an image memory even if it reduces the read-out frequency (drive frequency) of a solid state image sensor -- television televising -- it is on board, and since an image does not break off, trouble is not produced at all.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to a drawing. Explanation is concretely given using an example. The block diagram showing the electric configuration of the important section of the CCD drive circuit where a principle Fig. for the block diagram and drawing 2 which show the electric configuration of the CCD loading form wireless camera whose drawing 1 is one example of this invention to explain the principle of operation of CCD, and drawing 3 are included in this wireless camera, and drawing 4 are drawings for explaining actuation of this example. As shown in drawing 1 R> 1, this wireless camera consists of the camera head section 1 set as an image pick-up site, and the control unit section 2 which is set as the management location distant from this image pick-up location, and is connected by this camera head section 1 and wireless.

[0013] The above-mentioned camera head section 1 is carrying out drive control of CCD11 which carries out photo electric conversion of the optical image information caught with the camera lens which

is not illustrated to the image of a charge, and this CCD11 on a predetermined read-out frequency. The drive circuit 12 which takes out the image of a charge as a video signal of an analog, The process circuit 13 which carries out digital signal processing of the video signal of the analog taken out from CCD11, The sending circuit 14 for carrying out the radio transmission of the digital video signal outputted to the control unit section 2 through an antenna from this process circuit 13, The outline configuration is carried out from the dc-battery (power source) 16 for supplying power to the receiving circuit 15 which receives the control signal CTRL (after-mentioned) by which a radio transmission is carried out from a control circuit 2, and is given to the drive circuit 12, and CCD11 and each circuits 12-15.

[0014] Moreover, the receiving circuit 21 for the above-mentioned control unit section 2 to receive the video signal emitted as an electric wave from the sending circuit 14 of the camera head section 1, The image memory 22 transmitted to the television receiver which is not illustrated after storing the received video signal temporarily for every field and every frame, If the encoder 23 for making an image memory 22 address and memorize the video signal received by time series in a receiving circuit 21 and a motion of an image including color change are supervised and there is no motion The outline configuration is carried out from the comparator circuit 24 which generates and outputs a control signal CTRL, and the sending circuit 25 for carrying out the radio transmission of the control signal CTRL generated in this comparator circuit 24 to the camera head section 1. In addition, when a control signal CTRL is able to be given from a comparator circuit 24, an image memory 22 outputs a static image towards a television receiver etc. so that it may mention later.

[0015] Here, with reference to drawing 2 , the principle of operation of CCD11 is explained briefly. As CCD11 is shown in this drawing, it is the solid state image sensor of the MOS diode structure formed with the metal (gate electrode 1M, 2M, --, 9M, --)-oxide O-semi-conductor (drawing the n form Si) S, and has come to arrange the gate electrodes 1M, 2M, --, 9M and -- in the shape of a matrix. If a reverse bias is carried out, the depletion layer K without the charge which can move to a semi-conductor S front face will produce such an "MOS diode." This depletion layer K works as potential wells W and W and --, and can accumulate the electron holes (positive charge) p and p and -- which are a minority carrier among the carriers produced by incident light lambda and lambda and -- as an analog quantity. A transfer of electron holes p and p and -- is performed by impressing the transfer signal of a three phase to each gate electrodes 1M, 2M, --, 9M and --. First, as shown in this drawing 2 (A), electron holes p and p and -- are accumulated in the potential wells W and W as for which the negative high electrical potential difference V2 was made to the gate electrodes 1M and 7M by marking. Next, since the potential wells W and W by the side of gate electrode 2M and 8M and -- will become deep if the negative, still higher electrical potential difference V3 is impressed to the next gate electrodes 2M and 8M as shown in this drawing (B), it is transmitted to the gate electrodes 2M and 8M, and finally, electron holes p and p and -- change into the condition of this drawing (C), and turn to the following cycle. If this cycle is repeated, electron holes p and p and -- will be transmitted one after another, and will be taken out as a video signal of time series.

[0016] Drive control of CCD11 of the above-mentioned configuration is carried out by the drive circuit 12. The drive circuit 12 consists of a continuation pulse generating circuit 121 which generates the pulse signal for CCD11 drive continuously, an intermittent pulse generating circuit 122 which generates this pulse signal intermittently, and a pulse circuit changing switch 123 for choosing alternatively the continuation pulse generating circuit 121 or the intermittent pulse generating circuit 122 based on the control signal CTRL inputted, as shown in drawing 3 . Here, in the continuation pulse generating circuit 121, a pulse signal is generated at a rate of 60 pieces in 1 second, and a pulse signal is generated by the rate of one piece in 1 second in the intermittent pulse generating circuit 122. In addition, whenever one pulse signal is inputted from the drive circuit 12, as for CCD11 of this example, the optical image information for the 1 field is read.

[0017] So, if the continuation pulse generating circuit 121 (continuous action mode) is chosen, it will drive with an NTSC television system, a screen will be read at a rate of the 60 fields in 1 second, and CCD11 will be sent out to the process circuit 13. On the other hand, if the intermittent pulse generating circuit 122 (intermittent-control-action mode) is chosen, a screen will be read at a rate of the 1 field in 1

second, and it will be sent out to the process circuit 13.
[0018] Next, actuation of this example is explained with reference to drawing 4 . In the camera head section 1, if a power source is supplied to each part 11-15 from a dc-battery 16, first, the pulse circuit changing switch 123 of the drive circuit 12 will choose the continuation pulse generating circuit 121 (continuous action mode), and will give a pulse signal to CCD11 at a rate of 60 pieces in 1 second. Thereby, CCD11 is driven with an NTSC television system, and the screen of the 60 fields is read in 1 second. That is, in 1 second, the screen for the 60 fields is changed into the video signal of an analog, and is sent out to time series in the process circuit 13. In the process circuit 13, digital signal processing of the read screen (video signal) is carried out, and it is inputted into the control unit section 2 through a sending circuit 14.
[0019] An encoder 23 makes the received video signal store temporarily for every field and every frame in the control unit section 2 in an image memory 22. A comparator circuit 24 compares this field (or frame) outputted from an encoder 23 with the last field (or frame) outputted from an image memory 22, and supervises a motion [before and after]. If there is no motion in a screen as a result of this monitor, as shown in this drawing, a control signal CTRL is generated and it sends out to a sending circuit 25 and an image memory 22. If supply of a control signal CTRL is received from a comparator circuit 24, the radio transmission of the sending circuit 25 will be carried out to the camera head section 1.
[0020] In the camera head section 1, if a control signal CTRL is given from the comparator circuit 24 of the control unit section 2 via a receiving circuit 15, the pulse circuit changing switch 123 of the drive circuit 12 will choose the intermittent pulse generating circuit 122 (intermittent-control-action mode), and will reduce the number of the pulse signal given to CCD11 to one per second. In connection with this, the screens read from CCD11 decrease in number per second at once from the 60 fields per second in the 1 field. If it does so, a video signal will no longer be intermittently supplied to the control unit section 2, and if this is left, the final output image outputted from an image memory 22 will also be intermittent. So, in this example, as described above, the control signal CTRL generated in the comparator circuit 24 is not only sent out to the drive circuit 12 of the camera head section 1, but is sent out to an image memory 22. And without updating or eliminating a storage image, if supply of a control signal CTRL is received, an image memory 22 is carrying out a consecutive output as an image (static image) without a motion, and loses the way piece of an image television television on a plane.
[0021] If a certain motion is accepted in a screen after this, immediately, a comparator circuit 24 will interrupt generation of a control signal CTRL, and will return normal operation, i.e., the drive frequency of CCD11, at 60 fields / second.
[0022] Thus, since according to the configuration of this example the drive frequency of CCD11 decreases to 1/60 compared with the case where there is a motion when there is no motion on a screen, that part and power can be saved. Therefore, if the wireless camera of this example is used for the monitor of a warehouse etc., since there are few motions, power consumption can be saved sharply and battery life can be prolonged remarkably. in addition -- since the consecutive output of the static image in an image memory 22 is carried out even if it reduces the drive frequency of CCD11 -- an image television television on a plane -- breaking off -- it is not generated.
[0023] As mentioned above, although the example of this invention has been explained in full detail with the drawing, a concrete configuration is not restricted to this example, and even if there is modification of a design of the range which does not deviate from the summary of this invention etc., it is included in this invention. For example, a suitable read-out frequency range although the case where the read-out frequency (drive frequency) of CCD11 was reduced to 1/60 [usual] was stated in the above-mentioned example when there was no motion on a screen, in case it can fluctuate and there is no motion on a screen not only this but if needed is 1 / 10 - 1/120 of a read-out frequency in case a motion is shown in a screen. Moreover, a motion supervisory circuit is not limited to the above-mentioned comparator circuit 24, and may be established not only in the control unit section 2 side but in the camera head section 1 side. Moreover, not only CCD but BBD (bucket brigade device), CID (charge injection device), MOS-FET (metal oxide semiconductor-field effect transistor), etc. may be used for a solid state image sensor. Similarly, not only NTSC correspondence but PAL correspondence and

SECAM correspondence are sufficient as an image pick-up method.
[0024]
[Effect of the Invention] Since the read-out frequency (drive frequency) of a solid state image sensor decreases to 1 / 10 - 1/120 compared with the case where there is a motion according to the configuration of this invention when there is no motion on a screen as explained above, that part and power can be saved. Therefore, battery life can be prolonged remarkably. thus -- if it is made to carry out the consecutive output of the static image in an image memory even if it reduces the read-out frequency (drive frequency) of a solid state image sensor -- television televising -- it is on board, and since an image does not break off, trouble is not produced at all. In addition, since a motion supervisory circuit makes a judgment whether a motion is shown in a screen, an operator does not need to judge. Therefore, it is user-friendly.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the wireless image pick-up equipment which consists of the camera head section set as an image pick-up site, and the control unit section which is set as the location distant from this image pick-up location, and is connected with the camera head section by wireless.

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PRIOR ART

[Description of the Prior Art] For example, like a portable call signal receiving set (mobile station) or a notebook computer, in order to reduce useless power consumption in the equipment which uses a cell as a power source and to prolong the life of a cell, there are many things equipped with a certain kind of auto-power-off function (for example, reference, such as JP,63-141420,A, JP,1-260516,A, and JP,63-62014,A).
[0003] By the way, if the cable is attached to the television camera, since the wiring activity is complicated, an image pick-up environment will be restricted and carried out. Then, the wireless camera which connected the camera head section of a CCD drive and the control unit section which has an image memory by the radio transmission is offered from the former. With this kind of wireless camera, when the camera head section served as a dc-battery drive, since CCD (charge coupled device) also served as continuous action (60 read-out/second) at the time of an image pick-up, there was a problem that it could not bear in prolonged continuous duty. As a means to cancel such un-arranging, it is possible to apply an auto-power-off technique given [above-mentioned] in an official report to a wireless camera.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the read-out frequency (drive frequency) of a solid state image sensor decreases to 1 / 10 - 1/120 compared with the case where there is a motion according to the configuration of this invention when there is no motion on a screen as explained above, that part and power can be saved. Therefore, battery life can be prolonged remarkably. thus -- if it is made to carry out the consecutive output of the static image in an image memory even if it reduces the read-out frequency (drive frequency) of a solid state image sensor -- television televising -- it is on board, and since an image does not break off, trouble is not produced at all. In addition, since a motion supervisory circuit makes a judgment whether a motion is shown in a screen, an operator does not need to judge. Therefore, it is user-friendly.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, an auto-power-off technique given in JP,1-260516,A, JP,63-62014,A, etc. When the key input from a keyboard stops predetermined time, it is the technique which intercepts the power source of a notebook computer etc. automatically. Moreover, the conventional technique given in JP,63-141420,A By operating intermittently the switch for turning an amplifier on and off The power consumption at the time of the call signal reception from a key station is reduced, extension of a battery life is aimed at, and neither of the techniques can be used for reduction of the power consumption at the time of wireless camera actuation (at the time of an image pick-up).
[0005] This invention was made in view of the above-mentioned situation, can save power consumption sharply, and aims at offering the wireless image pick-up equipment which can prolong battery life remarkably.

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 The solid state image sensor which carries out photo electric conversion of the optical image information caught with the camera lens to the image of a charge, The drive circuit which reads the above-mentioned image from this solid state image sensor on a predetermined read-out frequency, The camera head section equipped with the cell which supplies power to the above-mentioned solid state image sensor and a drive circuit, Connect with this camera head section by the radio transmission, and the wireless image pick-up equipment which consists of the control unit section equipped with the image memory which stores temporarily the above-mentioned image read from the above-mentioned solid state image sensor is started. The above-mentioned drive circuit is characterized by reading an image from the above-mentioned solid state image sensor intermittently, when the above-mentioned optical image information does not change in time, while reading an image from the above-mentioned solid state image sensor continuously, when the above-mentioned optical image information changes in time.
[0007] Moreover, invention according to claim 2 relates to wireless image pick-up equipment according to claim 1, the above-mentioned control unit section or the camera head section is equipped with the motion supervisory circuit for supervising a motion of the above-mentioned image read from the above-mentioned solid state image sensor, and while this motion supervisory circuit judges that there is no motion in the above-mentioned image, the above-mentioned drive circuit is characterized by reading an image from the above-mentioned solid state image sensor intermittently.
[0008] Moreover, the 1st drive signal generating circuit which generates the 1st driving signal for invention according to claim 3 to relate to wireless image pick-up equipment according to claim 2, and for the above-mentioned drive circuit read an image from a solid state image sensor continuously, It is characterized by coming to have the circuit changing switch which chooses alternatively the above 1st or the 2nd drive signal generating circuit from the above-mentioned solid state image sensor based on the monitor result of the 2nd drive signal generating circuit which generates the 2nd driving signal for reading an image intermittently, and the above-mentioned motion supervisory circuit.
[0009] Moreover, invention according to claim 4 relates to claims 1 and 2 or wireless image pick-up equipment given in three, and is characterized by setting the above-mentioned read-out frequency at the time of reading an image intermittently as the range of 1 / 10 - 1/120 of the read-out frequency at the time of reading an image continuously.
[0010] Moreover, invention according to claim 5 relates to claims 1, 2, and 3 or wireless image pick-up equipment given in four, and it is characterized by the above-mentioned control unit section outputting the still picture currently stored in the above-mentioned image memory during the period when the above-mentioned drive circuit is reading the image from the above-mentioned solid state image sensor intermittently.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the electric configuration of the CCD loading form wireless camera which is one example of this invention,
[Drawing 2] It is a principle Fig. for explaining the principle of operation of CCD.
[Drawing 3] It is the block diagram showing the electric configuration of the important section of the CCD drive circuit included in this wireless camera.
[Drawing 4] It is an explanatory view for explaining actuation of this example.
[Description of Notations]
1 Camera Head Section
11 CCD (Solid State Image Sensor)
12 Drive Circuit
121 Continuation Pulse Generating Circuit (1st Drive Signal Generating Circuit)
122 Intermittent Pulse Generating Circuit (2nd Drive Signal Generating Circuit)
123 Pulse Circuit Changing Switch (Circuit Changing Switch)
13 Process Circuit
14 Sending Circuit
15 Receiving Circuit
16 Dc-battery (Cell)
2 Control Unit Section
21 Receiving Circuit
22 Image Memory
23 Encoder
24 Comparator Circuit (Motion Supervisory Circuit)
25 Sending Circuit
p Electron hole (charge)

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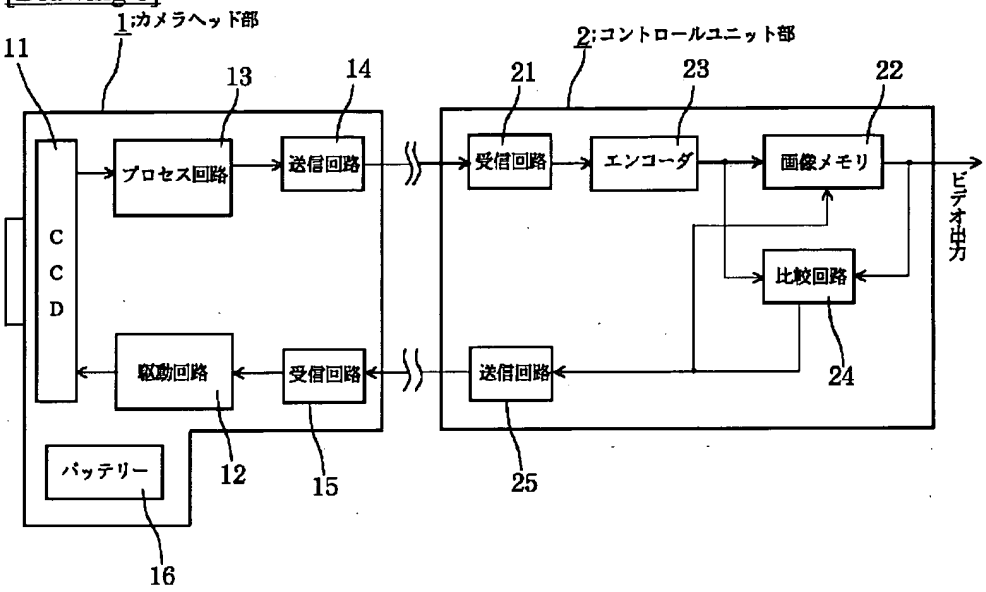
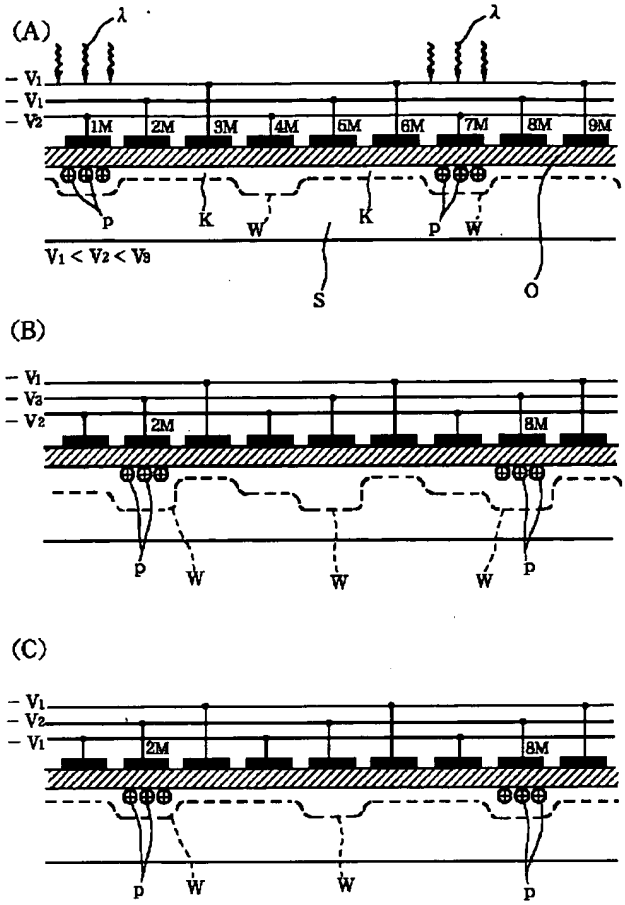
DRAWINGS

[Drawing 1]

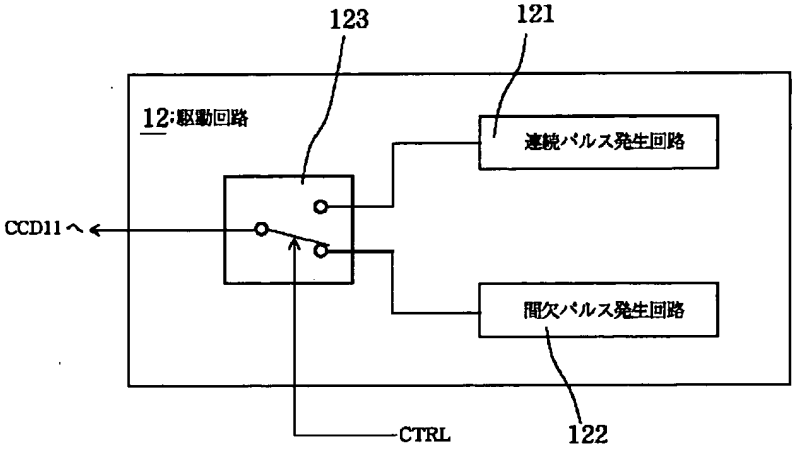


[Drawing 2]

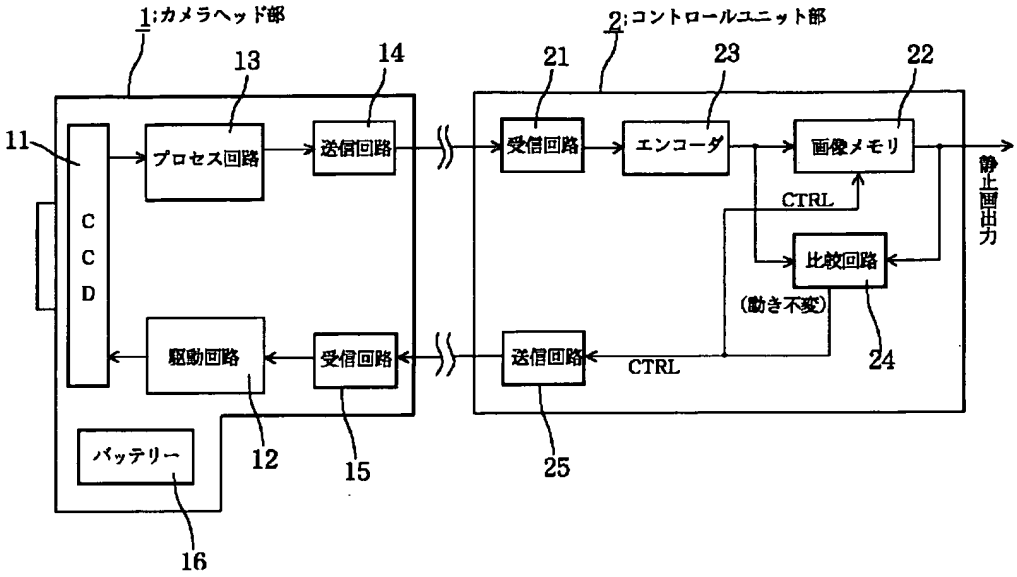
1: Camera Head portion
2: Control unit



[Drawing 3]



[Drawing 4]



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